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An Integrated Model of Bargaining Behavior and Outcomes

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ABSTRACT

Economic models of bargaining theory provide quantitative predictions of the ultimate outcomes of bargaining without explicit consideration of social-psychological factors. On the other hand, the social-psychological studies of bargaining show that various social-psychological factors are influential in changing bargaining behaviors and outcomes, yet the approach can not be used to locate the ultimate bargaining outcomes. Moreover, recent studies in marketing have shown that the accuracy of the Nash solution, the well known economic model of bargaining, in predicting the outcomes of buyer-seller bargaining is limited.

The author applies an economic model, the Cross model, which can generate a more general solution than the famous Nash solution. Furthermore, through concession rates and discount rates, the Cross model can be linked to five crucial social-psychological factors, namely, perceived relative power, organizational monitoring, tough self-image, time pressure, and risk-taking propensity. Hence, in this study the authors propose an integrated model of bargaining incorporating the Cross model and five important social-psychological factors.

The integrated model is more complete and thus has the potential for higher predictive power than those based on either approach alone. The model was operationalized and tested in an experiment simulating industrial buyer-seller bargaining in the laboratory setting. Empirical results generally support the integrated model. The theoretical contributions as well as several potential managerial implications of this integrated model, along with the limitations and further research opportunities, are discussed.

AN INTEGRATED MODEL OF BARGAINING BEHAVIOR AND OUTCOMES

by

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March 1992

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INTRODUCTION

There are two major theoretical approaches to the study of bargaining, the economic approach and the social-psychological approach (Young 1975; Rubin and Brown 1975; Druckman 1977; Carnevale and Pruitt 1992). The economic approach is most devoted to the rule of dividing the surplus. Many game-theoretical models and economic models of bargaining have been proposed to provide different rules of dividing the surplus; hence, they also provide quantitative predictions of the outcomes of bargaining (e.g., Nash 1950; Kalai & Smorodinsky 1975; Roth 1985). On the other hand, social-psychological studies of bargaining analyze the strengths and directions of the effects of such social-psychological factors as power, motivation, personality, time pressure on the bargaining process and the changes of outcomes (Rubin and Brown 1975; Druckman 1977; Pruitt 1981; Carnevale and Pruitt 1992).

These two approaches to the study of bargaining, however, have been developed independently. While economists recognize the importance of social-psychological factors in bargaining, no social-psychological factors have been explicitly modeled in the bargaining models based on economic approach (Young 1975; Roth 1985). Moreover, recent studies in marketing have shown that the accuracy of the Nash solution, the most well known bargaining model of the economic approach, in predicting the outcomes of buyer-seller bargaining, is limited (Neslin and Greenhalgh 1983, 1986; Gupta and Livne 1989). At the same time, the social-psychological approach has shown that numerous factors, (such as relative power and time pressure) influence the bargaining process as well as the outcomes (Rubin and Brown 1975; Carnevale and Pruitt 1992). But, this approach alone can not be used to locate the ultimate outcomes.

Given the strengths and weaknesses of these two approaches, and the complementary relationship between them, this paper presents and tests an economic bargaining model that incorporates social-psychological factors and, thus, is more complete and has potential for higher predictive power than a model based on one perspective alone. Through a literature review, the author identifies an economic bargaining model, the Cross model (Cross 1977, 1969, 1965), which can yield a solution more general than the Nash solution. The Cross model, through its concession rates and discount rates, is then connected to five crucial social-psychological factors - perceived relative power, organizational monitoring, bargainer's tough self-image, time pressure, and risk-taking propensity.

The major objectives of this study are: (1) To propose a comprehensive model which incorporates the strengths of both the economic and the social-psychological approaches of bargaining to better predict bargaining outcomes in the presence of the asymmetries of several crucial social-psychological factors. (2) To test theory to see <A> whether the various social-psychological factors affect concession rates and discount rates in the manner predicted, and <B> whether considering concession rates and discount rates can improve on the Nash solution in bargaining games.

THEORETICAL FOUNDATION

The economic approach includes both game-theoretic models of bargaining and economic models of bargaining (Young 1975; Harsanyi 1977). On the other hand, the impact of social-psychological factors on bargaining have been discussed in the social-psychology literature (e.g., Rubin and Brown 1975; Druckman 1977; Pruitt 1981), and in several studies in the marketing literature (e.g., Dwyer & Walker 1981; Schurr & Ozanne 1985). A brief review of the relevant literature is provided here to show the theoretical foundation of an integrated model.

(1) Game-theoretic Models of Bargaining

Most game-theoretic models of bargaining focus on predicting the ultimate outcome of bargaining (Young 1975). In the industrial marketing context, buyer-seller bargaining involving two parties trying to maintain a long-term relationship is the most common situation (Neslin and Greenhalgh 1983). Therefore, the game-theoretic models of bargaining to be discussed here are limited to two-person cooperative games. [1]

Perhaps the most prominent contributions in the traditional game-theoretic literature on cooperative bargaining are made by Nash (1950, 1953), Raiffa (1953), Harsanyi (1956, 1977), Kalai and Smorodinsky (1975), Kalai (1977), and Roth (1979a, 1979b). More recent developments have been made by Rubinstein (1982), Roth (1985), Binmore, Rubinstein, and Wolinsky (1986), Anbarci and Bigelow (1988), Harsanyi and Selton (1988), Gupta and Livne (1988), and Gupta (1989). Among all of these, Nash's theory is the most parsimonious, yet it is powerful enough to justify a rule of dividing the surplus hence to predict the rational, reasonable solution for most cooperative games (Friedman 1985; Eliashberg et. al., 1986). Many recently developed models are based on Nash's theory (Rubinstein 1982; Binmore et. al., 1986). Therefore, a summary of Nash's theory is presented to serve as a comparison model for the subsequent discussion.

Nash's Theory

In the 2-person game theory, given the set of bargainers' utility functions for all the potential outcomes, Nash (1950) concludes that the appropriate bargain is the one that maximizes the product of their utility increments from the no-settlement point (also called threat point). This conclusion follows from certain axiomatic assumptions (Nash 1950; Bishop 1963; Harsanyi 1977; Neslin & Greenhalgh 1983), namely, rationality, Pareto optimality, independence of utility function scale , independence of irrelevant alternatives, and symmetry axioms.

In mathematical terms, the Nash bargaining problem can be specified as the bargainers act to maximize the following objective function (setting the threat point at the origin of the coordinates):

$$\text{MAX. } U_1 * U_2 \qquad (1)$$

subject to the condition that utility-pairs (U_1 , U_2) belong to the set of all the possible outcomes.

The solution is $dU_1 / dU_2 = -U_1 / U_2$ (2)

Geometrically, when the utility possibilities frontier tangentially intersects a utility-product-indifferent curve ($U_1 * U_2 = k$), the utility possibilities frontier reaches the maximum utility-product-indifferent curve it can possibly be. And the slopes of these two curves will be the same at the tangentially intersected point, which is the solution point. This solution represents the only settlement that satisfies all five of the axiomatic conditions and is usually called the **"Nash solution"**.

The Nash solution requires only the bargainers' utility functions to predict bargaining outcomes. Therefore, two limitations exist: <1> the Nash solution does not handle all those factors which can not be captured by the utility functions, such as most social-psychological factors; <2> the symmetry axiom restricts the Nash solution from handling asymmetry problems, such as asymmetries of power, and of bargainers' individual differences. To ease the asymmetry problems, Roth (1979b) proposed an asymmetric Nash model presented in mathematic terms as follows:

$$\text{MAX. } U_1^{\,p} * U_2^{\,(2-p)} \qquad \text{where } 0 <= p <= 2 \tag{3}$$

and the solution is

$$dU_1 / dU_2 = -(U_1 / U_2) * (2-p) / p \tag{4}$$

A larger exponent p is interpreted as representing a relatively high bargaining power of bargainer 1. However, Roth's (1979b) modified model does not provide theoretical insight into how such asymmetry of power is formed. Besides, problem <1>, cited above, remains a major weakness of the Nash solution since this problem has not been explicitly dealt with in the existing literature.

Recently, Nash's theory has received a few empirical tests in the marketing context (Neslin and Greenhalgh 1983, 1986; Eliashberg et. al. 1986). Although the results, in general, support the Nash solution, Neslin and Greenhalgh's (1986) result shows that the accuracy of the Nash solution in predicting the outcomes of buyer-seller bargaining is still low (57.8% of the dyads did not achieve the Nash solution).

(2) Economic Models of Bargaining

Although game-theoretic models have been able to predict the likely ultimate outcome of bargaining and some recently developed models also explicitly incorporate the dynamic bargaining process (e.g., Rubinstein, 1982), none of them depict the concession mechanism of bargaining. As suggested by Young (1975), there are several models in the field of economics which are relevant to the analysis of bargaining as a method of achieving negotiated settlements under conditions of strategic interaction. The economic models depict bargaining as a procedure involving bargainers with conflicting interests and/or incomplete information attempting to achieve a mutually acceptable agreement through a strategy of demands and concessions that communicates each party's interests (Young 1975).

There are several economic models of bargaining (Zeuthen 1930; Pen 1952; Richardson 1960b; Cross 1977, 1969, 1965). Among them, the Cross model (1977, 1969, 1965) has been widely considered to be imaginative, rigorous, and has provided the basis for useful work both in theory development and in

experimentation on the subject of bargaining (Zartman 1977: p73). Bartos (1974) also indicates that Cross's model is very promising and that serious consideration should be given to this model as a theory of bargaining. More importantly, the Cross model can generate a solution that is more general than the Nash solution. That is because the Cross solution explicitly considers the asymmetries of the bargainers' concession rates and discount rates while the Nash solution does not.

The Cross Model

The Cross model emphasizes the roles of learning and time as two important factors in bargaining and conceptualizes the process of making concessions in terms of the adjustment of expectations through learning. In the Cross (1977, 1969) model, the individual bargainer starts the bargaining by calculating:

(1) a specification of his own preference ordering for the outcomes in the payoff possibility set (i.e., forming each bargainer's utility, U, or preference as a function of payoffs, q_i: $U_i = f_i(q_i)$);
(2) an estimate of the other bargainer's concession rate over time ($r_j(t)$); and
(3) a schedule of costs (Z_i) arising from the time that elapses before a specific contract is agreed upon. The sum of these costs Z_i, extended to the expected time of agreement, may be expressed in present utility value as:

$$Z_i = L_i \int_0^{W_i} e^{-D_i X} \, dx = L_i / D_i * (1 - e^{-D_i W_i}) \qquad (5)$$

where L_i is bargainer i's fixed cost, expressed in utility units, in each time period, D_i is his discount rate, and $w_i = (q_1 + q_2 - M) / r_j$ is the expected time necessary to reach agreement such that bargainer i receives a payoff q_i, and M is the total objective quantity available.[2]

Given this information, each bargainer proceeds to calculate the optimal level for his own initial demand, q_i, on the assumption that "the opponent will finally accept this offer by gradually conceding to this point." He does this by taking into account the trade-offs between improvements in the final settlement terms associated with higher initial demands, and the increased costs which higher demands produce as they extend the time required to reach a specific contract. In other words, the bargainer is to choose a demand q_i which maximizes his total present utility value U_i (i.e. to Max. $U_i = f_i(q_i) * e^{-D_i W_i} - Z_i$ with respect to q_i). The first and second order conditions for a maximum are:

$$[f_i(q_i) + L_i / D_i] * D_i / r_j = f_i'(q_i) \qquad (6)$$

and $f_i'(q_i)*(-D_i)/r_j + f_i''(q_i) < 0$, or since $f_i'(q_i) > 0$, and $r_j > 0$:

$$f_i''(q_i) / f_i'(q_i) * r_j - D_i < 0 \qquad (7)$$

After stating his initial demand, q_i, each bargainer observes the behavior of the opponent. If the opponent acts in the expected fashion, the bargainer retains his estimate of the opponent's concession rate and his initial bargaining plan for the next phase of the interaction. Otherwise, the bargainer adjusts his expectation about the opponent's concession rate and his demand accordingly. In general, if the opponent concedes more slowly (or rapidly) than expected, the bargainer makes a concession (or revise his demand upward) and lowers (or raises) his expectation about the opponent's concession rate. This simple learning process can be described in following mathematical terms:

$$dr_i / dt > 0, \text{ if } - dq_i / dt > r_i ;$$

$$dr_i / dt = 0, \text{ if } - dq_i / dt = r_i ; \quad (8)$$

$$dr_i / dt < 0, \text{ if } - dq_i / dt < r_i ;$$

Furthermore, the magnitude of dr_i / dt varies positively with the discrepancy between $-dq_i/dt$ and r_i : the greater the error in bargainer j's expectation, the faster his expectations will change. Thus it will require:

$$d (dr_i / dt) / d [-(dq_i / dt) - r_i] > 0 \quad (9)$$

Due to the learning process, the expected concession rate r_j is likely to change over time. As a consequence, bargainer i's outcome demand q_i will also be a function of time. Analytically, we can find dq_i / dt simply by differentiating equation (6) with respect to t (and substituting $f_i'(q_i) * r_j$ for $[f_i(q_i) + L_i / D_i] * D_i$) and solving for dq_i / dt, obtaining:

$$dq_i / dt = (dr_j / dt) / \{D_i - r_j * [f_i''(q_i) / f_i'(q_i)]\} \quad (10)$$

Both bargainers engage in a similar sequence of expectations-demand-adjustment-expectations-demand which leads to two important results:

<1> The Convergence of Expectations and Concession Rates: Suppose r_2 , bargainer 1's expectation of 2's rate of concession, is greater than r_1 . According to equation (9) and (10), larger errors in expectations bring about faster changes in expectations, and r_2 will fall faster than r_1. Finally, the ratio r_1 / r_2 is expected to display equilibrium properties (i.e., r_1 / r_2 approaches a constant). [3]

<2> The Cross Solution and the Nash Solution: The interaction process generated by the model consists of a repetition of these cycles until such time as agreement is reached. Agreement is defined by the situation in which the sum of the bargainers' demands is equal to the available supply, that is, $q_1 + q_2 = M$. Divide the left and right hand sides of equation (6), the utility maximization expression for bargainer 1, by the left and right hand sides of a similar utility maximization expression for bargainer 2, as follows:

$$f_1'(q_1) / f_2'(M-q_1) = [f_1(q_1)+L_1/D_1] / [f_2(M-q_1)+L_2/D_2] * D_1/D_2 * r_1/r_2 \quad (11)$$

If we follow Nash's example and shift the origins of the utility functions so that a point of permanent disagreement is represented by the origin, and if we consider the utilities only at the time of agreement, we obtain the following utility functions:

$$U_1 = f_1(q_1) + L_1 / D_1$$

$$U_2 = f_2(M-q_1) + L_2 / D_2 \quad (12)$$

Transforming equation (11) into utility terms as expressed in equation (12), we obtain **the Cross solution**:

$$dU_1 / dU_2 = - U_1 / U_2 * r_1 / r_2 * D_1 / D_2 \quad (13)$$

where U_i , D_i , and r_i , are bargainer i's utility, discount rate, and the opponent's expectation about bargainer i's concession rate, respectively. In the special case of similar bargainers - bargainers with equal discount rates

($D_1 = D_2$) and equivalent learning abilities - we concluded that we had an equilibrium relationship between expectations when $r_1 = r_2$. In this case, the bargaining outcome can be expected to be the Nash solution since the assumption of similar bargainers satisfies Nash's symmetry axiom.

The Cross solution shown above obviously is more general than the Nash solution and it is reasonable to expect that the Cross solution might have higher predictive power than the Nash solution in that the Cross solution directly captures the variances resulting from asymmetries of bargainers' discount rates and concession rates. However, the Cross model has not been subjected to empirical tests in a marketing context. This is probably due to following reasons: <1> economic models of bargaining have been considered a tool depicting the bargaining process rather than predicting the ultimate bargaining outcomes; <2> expectations are an important part of the Cross model and these measures are not directly observable; hence, the Cross model cannot be measured with ease (Bartos 1974: p296). However, in the Cross model, the expectation is a function of actual concession behavior (equation (8) and (9)), and the ratio of the two expectations as well as the ratio of the two concession rates will both converge to a constant. Hence, it is justifiable to use the ratio of the two actual concession rates to represent the ratio of the two expectations, r_1/r_2. This conjecture seems to be supported by Cross's (1977: p45) later paper. [4] Therefore, it becomes possible to test whether or not the Cross model has the potential to predict the outcomes of buyer-seller bargaining in a marketing context better than does Nash's theory.

The two types of models discussed above are representative of the economic approach to bargaining. Several concepts from the social psychology literature provide additional insights into bargaining behavior.

(3) Social-Psychological Factors in Bargaining

A few studies in the marketing literature have found that social-psychological factors are influential in bargaining. Of them, several important and relevant findings are summarized as follows: asymmetrical power structure is found to influence bargaining efficiency (Dwyer & Walker 1981; Dwyer 1984), a seller's expected trustworthiness-plus-toughness in bargaining leads to higher levels of buyer-seller cooperation and agreement and a higher level of buyer concessions (Schurr & Ozanne 1985), and buyers make higher systematic concessions when under the buying firm's close monitoring and simultaneously receiving ambiguous information from the seller (Clopton 1984).

Bargaining problems also have been widely discussed in the social psychology literature. Several comprehensive literature reviews are provided by Rubin & Brown (1975), Druckman (1977), Magenau & Pruitt (1979), Pruitt (1981), and recently by Carnevale & Pruitt (1992). This body of literature investigates the effects of such social-psychological factors as time pressure, power, pressure to reach agreement, the opponent's concession behavior, constituent surveillance and accountability, and risk taking on bargaining behavior (e.g. concession behavior, extent of bluffing, information exchange behavior) and outcomes (e.g. joint payoff, individual payoff, time required to reach an agreement, and number of agreements reached). Previous studies show that among these dependent variables, concession rate and payoff are most frequently investigated because the concession not only is the principal activity of the bargaining process but also determines the final payoff, and

achievement of a better payoff is the main objective of the bargaining. Equally important, the Cross model also shows that concession rate is a crucial factor in determining the final bargaining outcomes. It is the concession rate that links social-psychological factors and an economic bargaining model, the Cross model; hence, the concession rate makes an integrated bargaining model possible. Therefore, the rest of this section is devoted to identifying social-psychological factors which are determinants of concession rate and payoff.

According to the literature, a bargainer's concession rate is found to be larger when the bargainer is under higher time pressure (Smith et. al. 1982; Pruitt & Johnson 1970; Yukl et. al. 1974a), when the bargainer has higher pressure to reach agreement (Hamner 1974; Komorita & Barnes 1969), when a mediator is available to suggest compromised advice (Pruitt & Johnson 1970), when not under constituent's surveillance and accountability (Carnevale et. al. 1979; Benton & Druckman 1974), when the bargainer has lower relative power (Herman & Kogan 1968), and when the bargainer has lower propensity in risk taking (Harnett et. al., 1968; Sherman 1967).

Payoff usually is categorized into two types: joint payoff and individual payoff. Joint payoff is believed to be higher under cooperative or integrative bargaining than under distributive, or competitive bargaining. [5] Individual payoff is believed to be higher when the bargainer has more influence on the opponent (Pruitt 1981; Magenau & Pruitt 1979). The empirical studies found a supporting result that joint payoff is higher when the bargainers are under low time pressure (Yukl et. al. 1976), are not under constituent surveillance and accountability (Carnevale et. al. 1979), have equal power (Silver 1969), or have moderate limits and expect a cooperative future relationship (Ben-Yoav & Pruitt 1984). Individual payoff is higher when the bargainer is under lower pressure to reach agreement (Hamner 1974), when the bargainer's concession rate is low and the opponent is under high pressure to reach agreement (Hamner 1974), when the bargainer has a moderately high fall-back position (Bartos 1974), when the bargainer is not under constituent surveillance (Carnevale et. al. 1979), or when the bargainer has high relative power (Hornstein 1965).

In sum, the studies from the social-psychological approach largely investigate the strengths and directions of certain social-psychological factors on bargaining behavior and outcomes, especially the concession behavior and payoff. But this approach can not determine the ultimate bargaining outcomes as does the economic approach. Therefore, the social- psychological approach alone, like economic approach, is not enough to describe a complete bargaining theory.

Summary of the Critical Findings in the Relevant Literature

Several critical findings are drawn from the relevant literature discussed above:

(1) The bargaining models that draw from the economic approach are used for predicting the ultimate outcomes of bargaining, but these models usually do not accommodate social-psychological factors.

(2) The Nash solution is a reasonable predictor of the average outcome of dyadic bargaining in the marketing context (Neslin and Greenhalgh 1983, 1986; Eliashberg et. al., 1986), yet the prediction is not very accurate in predicting the individual dyadic outcome (Neslin and Greenhalgh 1986).

(3) The Cross model can yield a solution which is more general than the Nash solution.

(4) Social-psychological factors are influential in determining the process and the change of outcomes of bargaining, but the social-psychological approach alone can not locate the ultimate outcomes of bargaining.

Comparing the strengths and weaknesses of these two approaches, we conclude that it is important to integrate them. Fortunately, the Cross model can be connected to several crucial social-psychological factors discussed in this section through the concession rate and discount rate. Details of these connections will be discussed in the next section.

Based on the theoretical foundation discussed above, an integrated model of bargaining incorporating the Cross economic bargaining model and several crucial social-psychological factors is proposed and illustrated in Figure 1. The following section provides justification for the integrated model.

This integrated model builds on the theoretical foundations of social psychology by considering those factors that are direct antecedents to the concession rate and discount rate in the Cross model. As shown in the previous chapter, the social psychology literature of bargaining suggests that a bargainer's concession rate is influenced by the following factors: time pressure, pressure to reach agreement, the opponent's concession rate, presence of a mediator, constituent surveillance and accountability, risk-taking propensity, and relative power. Among these factors, the pressure to reach agreement is defined as "the cost of not reaching agreement" (Komorita & Barnes 1969; Hamner 1974); hence, it is a facet of relative power defined by Komorita (1977). To avoid double counting the effects of these two factors, they are deleted from the list of independent determinants for the concession rate. The interactions of the opponent's concession rate with the bargainer's throughout the bargaining is similar to the concession mechanism depicted within the Cross model. Furthermore, instead of picking the mediator factor, which is relatively unlikely to happen in the buyer-seller bargaining context, we develop a construct called tough self-image, and hypothesize that a bargainer's tough self-image would influence his concession behavior. Therefore, the five determinants of concession rate to be discussed are: relative power, constituent surveillance and accountability, bargainer's personality toughness, time pressure, and risk-taking propensity.

Perceived relative power (P)

Power can be defined as "the capacity to elicit concessions from the other party" (Magenau & Pruitt 1979), or "the power of A over B is equal to and based upon the dependence of B over A" (Emerson 1962). Power comes from five basic sources: legitimate, reward, expert, referent, and coercive (French & Raven 1959). A bargainer with higher power over the opponent tends to have greater strength maintaining his current demand, and hence use more distributive tactics and concede less. Research evidence (Hornstein 1965; Herman & Kogan 1968; Dwyer & Walker 1981) supports this hypothesis. But, when A feels stronger than B, there is no guarantee that B will feel weaker than A. Thus, it is the perceived relative power that leads the bargainer to behave in a strong or weak fashion, and in turn to concede less or more. Therefore, we hypothesize that

H1: A bargainer who perceives himself to be relatively more powerful in the bargaining situation than the opponent (i.e., the bargainer has higher perceived relative power) will have a lower concession rate than one perceiving himself as less powerful.

Organizational monitoring (OM)

Research evidence shows that constituent surveillance motivates bargainers to follow their constituents' advice about how to behave toward the opponent. Where constituents give no advice, bargainers believe that they

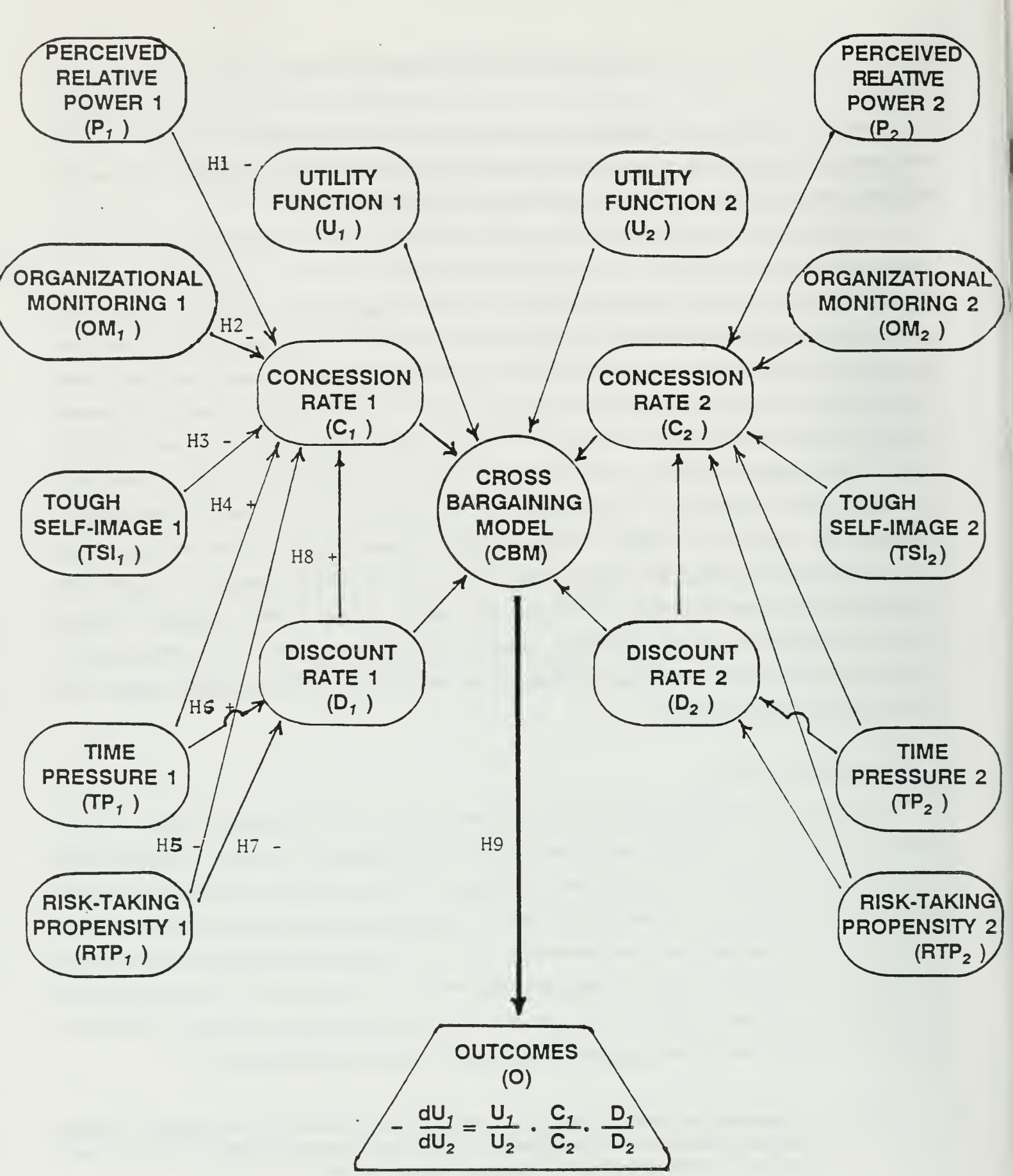

Figure 1: AN INTEGRATED MODEL OF BARGAINING BEHAVIOR AND OUTCOMES

favor a hard and aggressive approach (Organ 1971; Benton & Druckman 1974; Carnevale, Pruitt, & Britton 1979). Moreover, when the constituents can reward or punish bargainers on the basis of bargainers' performance, this acountablility encourages slow concession making (Bartunek, Benton, & Keys 1975; Ben-Yoav & Pruitt 1984). In the organizational buyer-seller bargaining context, the constituents usually are bargainers' supervisors who have the right to monitor and decide the bargainers' job rewards (i.e., with both surveillance and accountability). Hence, we use "organizational monitoring" for "constituent surveillance and accountability" and hypothesize that

H2: When a bargainer is monitored by his organization (usually his supervisor), his concession rate will be lower than it would be if he were not monitored.

This is probably because a bargainer has stronger motivation to show his supervisor that, during the negotiation, he has tried very hard to obtain or secure higher profits for the organization.

Bargainer's tough self-image (TSI)

Spector (1977b: p57) argues that "bargainer personality identifies basic predispositions toward the opponent and motives for future actions and responses. Personality factors are likely to influence the toughness or softness of positions that are taken." Tough self-image, defined as "an individual's self-image about his/her attitudinal propensity not to yield," can thus be a critical factor that facilitates the formation of an intention not to yield, which in turn leads to the behavioral toughness. Tough self-image was discussed by James (1890) in his famous book, Principles of Psychology, under the label of "toughmindedness", and was further elaborated by Eysenck (1954, 1961) and Eysenck & Wilson (1976) as "toughminded attitude". Toughminded attitudes are described as practical rather than idealistic, expedient rather than altruistic, dogmatic rather than flexible, and active rather than passive. This construct may also be related to several other personality traits discussed by Rubin & Brown (1975), such as cooperativeness, inflexibility, and machiavellianism. Inspired by Spector's (1977b) work and by Geis's (1970) finding that a bargainer who is high in machiavellianism tends to defend his demands, and by Kelly and Stahelski's (1970a) finding that bargainers with a cooperative attitudinal personality tend to behave more cooperatively than those with opposite attitude, we hypothesize that

H3: A bargainer with a tougher self-image will behave more toughly; hence will have a lower concession rate than will one who is with softer self-image.

Time pressure (TP)

Time pressure can be defined as "a time cost" (Yukl et. al. 1976), "a perception on the part of both bargainers that the bargaining is about to be terminated whether or not an agreement is reached" (Pruitt & Drews 1969; Yukl 1974a), or "closeness to a deadline" (Smith et. al. 1982). Under high time pressure, bargainers are forced to do quick settlement; hence, time pressure will result in a relatively high concession rate (Smith et. al. 1982; Yukl 1974a) and in a situation which is relatively unconducive to problem-solving and deliberate search for integrative solutions, and in turn lower payoff (Yukl et. al. 1976). Therefore, we hypothesize that

H4: A bargainer with higher time pressure will be willing to concede faster in order to reach the agreement earlier, to save time cost or be able to reach an agreement before the deadline, than will one with less time pressure; hence he will have a higher concession rate.

Risk-taking propensity (RTP)

Risk-taking propensity can be defined as "a general willingness to take risks" (Rubin & Brown 1975). Distributive bargaining strategy is a trade-off between high self payoff if an agreement is achieved and high risk of no agreement. Therefore, high risk-takers would be more willing to conduct a distributive strategy with a low concession rate at the expense of a high risk of no agreement. Harnett et. al. (1968), found that under incomplete information situation, high risk-takers yield less (make fewer concessions) than low risk-takers. Therefore, we hypothesize that

H5: A bargainer with a higher risk-taking propensity will have a lower concession rate relative to a more risk-averse bargainer.

Discount rate (D)

Discount rate is the rate bargainers used to discount the value of the utility they receive in the future. It is the other determinant of final bargaining outcomes in the Cross model and has a strict definition in economic literature which is

$$D = (1+R)/(1-THETA) - 1 \qquad (14)$$

where THETA is the risk of failing to materialize the future reward and R is time cost.
It is clear from above equation that higher D is due to higher THETA or higher R. Because time pressure is positively correlated with time cost, higher time pressure will lead to higher D. Furthermore, high risk-takers would tolerate higher risk; hence they would perceive a lower THETA value, in turn leading to lower D. Therefore, we hypothesize that

H6: A bargainer under higher time pressure will possess a higher discount rate than a less pressured bargainer.

H7: A bargainer with higher risk-taking propensity will possess a lower discount rate than a more risk-averse bargainer.

Moreover, to maximize the future utility, a bargainer with a higher discount rate would have incentive to reach agreement earlier by conceding faster than a bargainer with a lower discount rate. Therefore, we further hypothesize that

H8: A bargainer with a higher discount rate will concede faster than a bargainer with a lower discount rate.

AN INTEGRATED MODEL

The mathematical formulation of this integrated bargaining model is as follows:

$$D_i = \alpha_{1i} + y_{1i} * TP_i + y_{2i} * RTP_i + e_{1i} \quad (15\text{-}i)$$

$$C_i = \alpha_{2i} + b_{1i} * P_i + b_{2i} * OM_i + b_{3i} * TSI_i + b_{4i} * TP_i + b_{5i} * RTP_i + b_{6i} * D_i + e_{2i} \quad (16\text{-}i);\ i = 1,2$$

where e_{ji} are random errors and α_{ji} are constants.

The parameters b_{1i} (corresponding to hypothesis 1, H1), b_{2i} (H2), b_{3i} (H3), b_{5i} (H5), and y_{2i} (H7) are hypothesized to be negative while b_{4i} (H4), b_{6i} (H8), and y_{1i} (H6) are hypothesized to be positive.

Furthermore,

H9: The model predicts the outcome of bargaining to be the solution to the following equation:

$$- dU_1 / dU_2 = U_1 / U_2 * C_1 / C_2 * D_1 / D_2 \quad (17)$$

where U_i, C_i, and D_i are bargainer i's utility, concession rate, and discount rate, respectively.

The next section presents the data-collection method, describes the instrument used, and gives the detailed procedure for obtaining all the measures used in testing the hypotheses.

RESEARCH METHODOLOGY

An experiment simulating buyer-seller bargaining over a hypothetical sales agreement was conducted in a behavioral laboratory with an eight-cell orthogonal main-effect experimental design because three out of the five social-psychological factors included in the model needed to be manipulated to ensure sufficient variation of these variables. Perceived relative power was manipulated in three levels (higher, equal, lower), organizational monitoring in two levels (with, without), and time pressure in two levels (high, low). Utility functions were predetermined by the profit schedule given to the bargainers. Other variables were measured.

Experimental Design

A complete design for this study would involve crossing buyers' three levels of perceived relative power, two levels of organizational monitoring, and two levels of time pressure with those of seller in a 3 x 2 x 2 x 3 x 2 x 2 between-dyads design. However, in this instance, a balanced 3 x 2 x 2 x 2 x 2 between-dyads design was attained by matching buyer-seller's perceived relative power as following: high-low, equal-equal, and low-high. Furthermore, since the proposed model does not postulate interaction effects between the independent variables in equations 15-i and 16-i, only main effects were tested. Therefore, an orthogonal main-effect plan of factorial design was sufficient for this study. According to Addelman (1962: p26-27), an orthogonal main-effects plan for the 3×2^4 experiment is an eight-cell design. The treatment combinations for the present study are shown in Table 1.

Table 1

TREATMENT COMBINATIONS

P_S	P_B	OM_S	OM_B	TP_S	TP_B
0	0	0	0	0	0
0	0	1	1	1	1
1	-1	0	0	1	1
1	-1	1	1	0	0
-1	1	0	1	0	1
-1	1	1	0	1	0
1	-1	0	1	1	0
-1	1	1	0	0	1

where P_B and P_S represent buyer's and seller's perceived relative power, respectively. Level "0" is assigned when bargainers perceive equal power, level "1" is assigned when bargainers perceive higher power, and level "-1" is assigned when bargainers perceive lower power than their opponents. OM_S and OM_B represent organizational monitoring on the seller and the buyer respectively. Level "0" is assigned when without organizational monitoring, and level "1" is assigned when under organizational monitoring. TP_S and TP_B represent time pressure to the seller and the buyer respectively. Level "0" is assigned when under low time pressure, and level "1" is assigned when under high time pressure.

Task Scenario

A role-playing task was employed in which an industrial buyer and seller bargained over a hypothetical sales agreement involving such issues as price, delivery time, and after-sale service, which are typically important to industrial buyer-seller bargaining. Buyers and sales representatives bargained, on behalf of their own companies, on these three purchase-related issues for an industrial good. Each issue was presented along a scale of possible settlement points, each point associated with a particular utility level for the issue (see Table 2). The utility schedule was so designed that the issues involved were of differential importance (utility) between settlement points to the buyers and the sellers. Since the integrated model also focused on how bargainers divided the surplus, given that the utility possibilities frontier (the set of pareto optimal outcomes) was known to both parties, the information of both parties' preference was given to both parties.

Subjects

To test the theory, data were collected from 150 (75 dyads) MBA students recruited at a large university located in western New York. This sample size is greater than the sample size required in the original sampling plan, which is 128 persons or 64 dyads (8 cells x 8 dyads/cell x 2 persons/dyad). [6] The subjects in the buyers' group have a mean working experience of 5.82 years and a medium level of negotiation experience (mean of 4.1 measured on three self-report Likert scales of 1 to 7, with 1 representing 'very little negotiation experience' and 7 representing 'extensive negotiation experience'). The subjects in the sellers' group have a mean working experience of 5.86 years and a medium level of negotiation experience (mean of 4.2 measured by the same scales as those used for the subjects in the buyer group). Above profiles show that the subjects used in this study were qualified for the required negotiation task.

To increase subjects' motivation to conduct the bargaining task seriously, certain extra credits for the courses they were taking were given to each subject proportional to their performance in the bargaining. Pretest data showed that such an incentive system could motivate the subjects effectively because they, as MBA students, considered grading to be relevant and important to them.

Variables

Perceived relative power was manipulated by the relative degree of dependence similar to the way used in Dwyer & Walker (1981). In the higher power situation, subjects were told that "you are the sole supplier (or buyer) and your opponent is only one of your three buyers (or suppliers) for this industrial good. Your opponent really depends on you in this agreement." In the case of an equal power situation, the statement was "you are one of a few suppliers (or buyers) of your opponent and your opponent is one of the a few buyers (or suppliers) of you for this good. You and your opponent are equally dependent on each other in this agreement." For the lower power case, the statement was a reverse of that for higher power case.

Organizational monitoring was manipulated by telling the bargainer, if under organizational monitoring, that "your supervisor will be watching the whole bargaining process and will use your performance in this bargaining to assign an extra credit for you." The bargainer could see his supervisor sitting behind him in the

same room. During bargaining, for each round of offer the bargainer was asked to pass his offer and the counteroffer he receives to his supervisor via the experimenter. A bargainer without organizational monitoring was told that his supervisor would be busy doing something else and hence would not be able to watch the bargaining process. The bargainer was not told anything about the consequence of his performance in this bargaining. In addition, the bargainer could see that his supervisor was not with him in the room.

Time pressure was manipulated by cost of time and the approach of a deadline. All the bargainers were told that they would receive extra credit for the courses they were taking proportional to the utility value level they achieved in the agreement. A bargainer in high time pressure (HTP) was told that "Due to high costs in maintaining the bargaining, **you have only 10 rounds of offers** [7] to reach agreement (each round consists of an offer from you and a counteroffer from your opponent). In other words, you are allowed to try up to 10 offers to your opponent. If you have not reached agreement with your opponent in 10 rounds of offers, the 'no agreement' alternative will be imposed. Moreover, there will be a bargaining cost associated with the failure to reach agreement. Failure to reach agreement on each trial will result in the deduction of 5% of your extra credit, which will be proportional to the value level you achieve in the agreement, to compensate part of the bargaining cost for each trial." To increase the effectiveness of the manipulation, a reminder note indicating the cumulative loss was given to the bargainer in each round. Bargainers in low time pressure were told that "you have plenty of time to negotiate for this agreement and there will be no cost for each trial."

There was a set of manipulation-check questions for the above three variables before and after the subjects actually engaged in bargaining. The pre-bargaining check was to examine the effectiveness of the manipulation and the post-bargaining check, when compared to the pre-bargaining check, was used to examine the perceptual change of these three variables that the subjects learned from the actual bargaining process. Results of these manipulation checks are presented in Table 5.

Tough self-image. Although this variable has not been investigated in the social psychology literature on bargaining, twelve items from Rahim's (1983) "Dominating-Obliging Scale", developed to capture differences in handling interpersonal conflict, have the face validity to measure "a bargainer's tendencies to be ruthlessly competitive, seeking mainly self-interest, oriented toward winning, driving a hard bargain," (Rahim, 1983) a construct conceptually similar to the tough self-image proposed in our model. Therefore, mixed with several filler items, these twelve items were used to measure tough self-image as shown in Exhibit 1.

Risk-taking propensity. Several measures were developed before 1961 for risk-taking propensity. Unfortunately, Slovic (1962) found that those measures do not demonstrate convergent validity; hence, he concluded that none or only a few of these measures actually capture the trait. A few instruments were developed after 1962. Kogan and Wallach's (1964) instrument was used in studies by Harnett et. al. (1968) and Sherman (1967) found a significant relationship between risk-taking propensity and bargaining behavior. The Kogan and Wallach's instrument consists of twelve choice dilemmas, each of which describes a hypothetical situation in which the subject is asked to indicate the lowest probability of success he would tolerate and still recommend that the risk action be taken by the central person in the incident. Exhibit 2 illustrates the type of incident

included. However, Teger and Pruitt (1967) found that only incidents 1, 4, 6, 7, 9, and 11 of Kogan and Wallach's instrument actually measure risk-taking propensity well. Therefore, this six-incident instrument, shown in Exhibit 2, was used to measure risk-taking propensity.

Utility function. Bargainers were given a utility scoring table shown in Table 2 and to use it to represent bargainers' utility functions. To minimize the potential error owing to the subjects' inability to find the utility possibilities frontier, the possible outcomes on the utility possibilities frontier as shown in Tabl 3 were also given to both parties.

Table 2

BUYER AND SELLER VALUE TABLES

Delivery time		*Price*		*After-sale service*	
Level	*Value point*	*Level*	*Value point*	*Level*	*Value point*
			BUYER		
1 week	*1000*	P_5	*700*	*A*	*400*
1 month	*900*	P_4	*500*	*B*	*300*
2 months	*600*	P_3	*300*	*C*	*200*
3 months	*300*	P_2	*100*	*D*	*100*
4 months	*0*	P_1	*-100*	*E*	*0*
5 months	*-300*				
			SELLER		
1 week	*0*	P_5	*-100*	*A*	*-300*
1 month	*100*	P_4	*100*	*B*	*0*
2 months	*200*	P_3	*300*	*C*	*300*
3 months	*300*	P_2	*500*	*D*	*600*
4 months	*400*	P_1	*700*	*E*	*900*
5 months	*500*				

*** The value of no agreement is equal to 0 point.**

Table 3

THE EFFICIENT OUTCOMES

Alternative	*Delivery*	*Price*	*After-sale service*	*Total value point to the* BUYER	SELLER
1	*one week*	*P5*	*A*	*2100*	*-400*
2	*one week*	*P5*	*B*	*2000*	*-100*
3	*one week*	*P5*	*C*	*1900*	*200*
4	*one week*	*P5*	*D*	*1800*	*500*
5	*one week*	*P5*	*E*	*1700*	*800*
6	*one month*	*P5*	*E*	*1600*	*900*
7	*one week*	*P4*	*E*	*1500*	*1000*
8	*one month*	*P4*	*E*	*1400*	*1100*
9	*one week*	*P3*	*E*	*1300*	*1200*
10	*one month*	*P3*	*E*	*1200*	*1300*
11	*one week*	*P2*	*E*	*1100*	*1400*
12	*one month*	*P2*	*E*	*1000*	*1500*
13	*one week*	*P1*	*E*	*900*	*1600*
14	*one month*	*P1*	*E*	*800*	*1700*
15	*two months*	*P1*	*E*	*500*	*1800*
16	*three months*	*P1*	*E*	*200*	*1900*
17	*four months*	*P1*	*E*	*-100*	*2000*
18	*five months*	*P1*	*E*	*-400*	*2100*

Concession rate. Since the ratio of two bargainers' concession rates and the ratio of two bargainers' expectations about opponents' concession rates were expected to converge to a constant as bargaining went on, the concession rate was defined and measured as the magnitude of the difference of two consecutive demands (in terms of the associated utility value points) when the ratio of two bargainers' observable changes of demand converged to a constant ratio. These data were derived from the two bargainers' actual concession behavior recorded on their 'Offers and Counteroffers Record'.

Discount rate was measured by the method similar to the one used by Benxion et. al., (1990) in an experimental study of discount rates. The method used in this study is to ask subjects four scenario questions such as the following question: "Given the bargaining situation (especially cost of time) that you are facing, assume you get an agreement in this period which has 1,000 points of value to you. Suppose you have a chance to trade in these 1,000 points of value for an agreement in the next period. But there will be some risk that you will never obtain that agreement in the next period; hence you will have some chance of losing the 1,000 points when you trade in your current agreement. Assuming that you have to trade in the current agreement, please estimate and write down the minimum points of value the future agreement must have in order for you to feel that you do not lose by trading in your current agreement for the future one." This statement includes the two major elements of the discount rate. First, the time cost a bargainer faced by the manipulation stimulus for time pressure would lead to a time preference. Second, bargainers with different risk-taking propensities would form different risk rates, THETAs, when told there is some risk of losing the 1,000 points of value from current agreement. The discount rate is equal to subtracting one from the ratio between the value points of the future agreement and that of the current agreement.

Procedure

Before the experiment was conducted, subjects were requested to answer opinion questionnaires I and II (shown in Exhibits 1 and 2) to measure the subjects' tough self-image and risk-taking propensity when they signed up for the experiment without knowing what the experiment would be. The answered questionnaires were returned to the experimenter about one week before the experiment was actually conducted. Since the subjects were MBA students in the same school, they might know each other to some extent. To avoid undesirable personal effects, the members of a pair were arranged to bargain with each other without knowing one another's identity. On arrival at the experimental site, subjects were randomly assigned to pairs, then two confederates were introduced as their supervisors. The pair of two bargainers could not see or talk to each other but both could see the experimenter and their own supervisors if they were under organizational monitoring condition. Subjects were given a booklet containing (1) preliminary instructions providing an overview of the bargaining task and their role in the bargaining, (2) the bargaining scenario describing the buying firm and the purchase to be bargained, the seller and selling firm, the specific issues to be bargained, and information about the possible outcomes (different combinations of price level, delivery lead time, and after-service level of the hypothetical merchandise), and (3) procedural instructions explaining the utility scoring table and how to make offers and receive offers through the experimenter.

After subjects had read through the booklet, a pre-bargaining questionnaire was administered to test how well subjects understood their own and their opponents' preferences on each issue to be bargained. Thereafter, subjects read randomly assigned manipulation statements and answered pre-bargaining manipulation-check questions. Then, subjects began to bargain with their opponents by writing their demands on the 'Offers and Counteroffers Record' sheet and passed it to their opponents through the experimenter until an agreement or a predetermined number of trials was reached. Finally, subjects answered a set of post-bargaining manipulation checks and a post-bargaining questionnaire then receive a debriefing session before leaving.

Analysis Plan

After data were collected for the variables discussed above, the analysis proceeded as follows. First, the parameters in equations 15-1, 15-2, 16-1, and 16-2 were estimated by two OLS (ordinary least squared) regression analyses for equations 15-1 and 15-2 and a 3SLS (three-stage least squared) regression analysis for equation 16-1 and 16-2, based on the data collected from the experiment. The justification for doing so is that <1> equations 15-i and 16-i form a recursive model because discount rate (D_t) is formed prior to and contributes to the formation of concession rate (C_t); hence, equations 15-i and 16-i can be estimated separatedly. However, <2> the two bargainers' concession behaviors were interacting with each other during the bargaining; therefore, the error terms in equations 16-1 and 16-2 should be correlated and a 3SLS is required to estimate theses two equations simultaneously.

These equations were then tested by the F statistics and hypotheses 1 through 8 were tested by T statistics. In order to conduct the above regression analyses, the three manipulated variables in equations 15-i and 16-i became independent variables in the regression models by assigning a categorical variable to represent

the three levels of perceived relative power, and each a dummy variable for organizational monitoring and time pressure, respectively, to represent the two levels of each of these two variables.

Second, the predictive power of the integrated model was tested in three steps. Step 1 was to derive predicted outcomes of the integrated model by solving equation 17. Then, in step 2, each pair of bargainers' actual outcome was compared to its corresponding predicted outcome to see how close they were with each other. Percentage deviation was calculated to show how much actual outcome deviated from predicted outcome. Moreover, a pair-t-test was conducted to test the correlation coefficient and the significance of the mean difference between actual and predicted outcomes. Finally, in step 3, actual outcomes were regressed on predicted outcomes across all bargaining pairs. Although ideally one could argue for intercept to be 0 and slope to be 1, the predictive power of the integrated model was considered to be the closeness between actual and predicted outcomes or the closeness between actual slope and the ideal slope, 1.

It took some effort to obtain the predicted outcomes of the integrated model by solving equation 17. Theoretically, the solution described in equation 17 must be solved by the differential equation method after the two bargainers' utility functions and the ratios of the two concession rates and of the two discount rates are obtained. However, the two bargainers' utility possibilities frontier in this study is a composition of three linear line segments. [8] This special case allowed us to compute the predicted outcomes algebraically. Detail of the calculation can be obtained from the author.

RESULTS

This section presents the empirical findings of the study, techniques employed for testing the hypotheses, and the discussion of the results.

Data

A total of 75 pairs of data were collected from 150 MBA students. Among them, 64 pairs reached agreement while 11 pairs did not. The results of a quiz designed to test the subjects' understanding about the negotiation task showed that the subjects had good understanding about the task and the information provided to them. Due to the scrutiny of the experimenter, all the subjects but two answered all the questions and those two subjects did answered all the questions required for the analysis in this study. [9] Hence, all 75 pairs of data were used to test equations 15-i and 16-i since these equations are independent of final agreement. However, when testing equation 17, the predictive power of the integrated model, only those 64 pairs of data with agreement were used since the 11 no-agreement pairs had no actual agreement to be tested against their corresponding predicted outcomes derived from equation 17.

Measures

Table 4 summarizes the major values of four important variables. Each of these is discussed in the following.

Tough self-image measured by the 16-item instrument (shown in Exhibit 1), is satisfactorily reliable with Cronbach α values of 0.83 and 0.80 for buyers' and sellers' groups, respectively. Values of tough self-image in this study range from 1.53 to 6.38 on the scale of 1 to 7, with 1 representing 'very soft' and 7 representing 'very tough'.

Risk-taking propensity measured by the 6-item instrument (shown in Exhibit 2), is marginally reliable with Cronbach α values of 0.69 and 0.51 for buyers' and sellers' groups, respectively. Values of risk-taking propensity in this study range from 1.83 to 5.5 on the scale of 1 to 7, with 1 representing 'very low risk taking propensity' and 7 representing 'very high risk taking propensity'.

Discount rate measured by the 4-item instrument, is satisfactorily reliable with Cronbach α values of 0.85 and 0.74 for buyers' and sellers' groups, respectively. Values of discount rate in this study range from 0.1 to 4 with mean value of 0.63 and standard deviation of 0.54.

Concession rate ranged from 11 to 650, mean value of 161 and standard deviation of 111 in the buyers' group, and the values ranged from 33 to 450, mean value of 145 and standard deviation of 85 in the sellers' group.

Manipulation Check

The effectiveness of the three manipulations employed in this study were checked by the following

questions:

1) The power you have to force your opponent to accept your demands is

1	*2*	*3*	*4*	*5*
much lower than that of my opponent.	*somewhat lower than*	*equal to*	*somewhat higher than*	*much higher than*

2) Do you feel that you are monitored by your vice president? If yes, how closely or tightly do you feel you are monitored?

0	*1*	*2*	*3*	*4*	*5*
No	*very loosely*	*somewhat loosely*	*moderately*	*somewhat closely*	*very closely*

3) Do you perceive any time pressure in bargaining for this contract? If yes, how heavy is the time pressure?

0	*1*	*2*	*3*	*4*	*5*
No	*very light*	*somewhat light*	*moderate*	*somewhat heavy*	*very heavy*

The manipulation check values presented in Table 5 show that all three manipulations were effective and consistent before and after bargaining.

Hypothese Testing

Hypotheses 1 through 5 and hypothesis 8 were tested using the regression results of equations 16-1 and 16-2 presented in Table 6 while hypotheses 6 and 7 were tested using the regression results of equations 15-1 and 15-2 presented in Table 7. Finally, hypothesis 9 was tested using equation 17. The testing results between actual and predicted outcomes derived from equation 17 are presented in Table 8 through 12. Based on these, the testing result of each of the nine hypotheses is described as follows.

Hypothesis 1 was supported by the data since the coefficients of perceived relative power in the buyers' and sellers' groups were statistically significant at α level of 0.1 and 0.05, respectively. The negative coefficient indicates that a bargainer with higher perceived relative power tends to have a lower concession rate, which is as hypothesized.

Hypothesis 2 was not supported by the data since the coefficients of organizational monitoring in the buyers' and sellers' groups were both not significant although in right direction. This result implied that, in this study, we could not detect an influence on bargainers' concession behavior by the monitoring of their vice presidents during the bargaining. However, the coefficients were in right direction; hence we may claim it is only directionally supported.

Hypothesis 3 was partially supported by the data. The coefficient of bargainer's tough self-image in the buyers' group was statistically significant at α level of 0.1 while that in the sellers' group, although in hypothesized direction, was not significant. The negative coefficient indicates that a bargainer with tougher self-image would behave tougher; hence would have a lower concession rate. These results confirmed hypothesis 3 in the buyers' group, yet only directionally confirmed in the sellers' group.

Hypothesis 4 was supported by the data. The coefficients of time pressure in the buyers' and sellers' group were statistically significant at α level of 0.05 and 0.1, respectively. The positive coefficient, coincided with the hypothesized direction, indicates that a bargainer with higher time pressure would have a higher concession rate.

Table 4

MEASUREMENT RESULTS FOR IMPORTANT VARIABLES

Variables	*Items*	*Cronbach α Value*	*Minimum*	*Maximum*	*Mean*	*Standard Deviation*
TSIB	*16*	*0.83*	*1.53*	*6.38*	*3.78*	*0.79*
TSIS	*16*	*0.80*	*2.25*	*6.00*	*3.69*	*0.69*
RTPB	*6*	*0.69*	*1.83*	*5.50*	*3.69*	*0.82*
RTPS	*6*	*0.51**	*2.67*	*5.83*	*3.94*	*0.69*
DB	*4*	*0.85*	*0.10*	*4.00*	*0.63*	*0.54*
DS	*4*	*0.74*	*0.10*	*4.00*	*0.67*	*0.67*
CB			*11.0*	*650*	*161.5*	*111.1*
CS			*33.3*	*450*	*145.1*	*85.2*

Where

TSIB: Buyers' tough self-image
TSIS: Sellers' tough self-image
RTPB: Buyers' risk-taking propensity
RTPS: Sellers' risk-taking propensity
DB: Buyers' discount rate
DS: Sellers' discount rate
CB: Buyers' concession rate
CS: Sellers' concession rate
**: This value is considerably lower than 0.7, the generally acceptable level.*

Table 5

MANIPULATION CHECK RESULTS

			Pre-bargaining Check				*Post-bargaining Check*			
Variables	*Group Code*	*Scale*	*Mean*	*Std Dev*	*F*	*Sig.*	*Mean*	*Std Dev*	*F*	*Sig.*
PB	*-1*	*1 - 5*	*1.83*	*0.79*	*79*	*.000*	*1.83*	*0.65*	*82*	*.000*
	0		*2.72*	*0.57*			*2.78*	*0.55*		
	1		*4.18*	*0.68*			*4.00*	*0.68*		
PS	*-1*	*1 - 5*	*1.89*	*0.89*	*55*	*.000*	*1.85*	*0.82*	*57*	*.000*
	0		*3.56*	*0.78*			*3.22*	*0.73*		
	1		*4.30*	*0.92*			*4.07*	*0.78*		
OMB	*0*	*0 - 5*	*2.28*	*1.52*	*11*	*.002*	*1.86*	*1.46*	*7*	*.009*
	1		*3.41*	*1.48*			*2.80*	*1.52*		
OMS	*0*	*0 - 5*	*2.17*	*1.87*	*18*	*.000*	*1.58*	*1.78*	*12*	*.001*
	1		*3.66*	*1.05*			*2.84*	*1.31*		
TPB	*0*	*0 - 5*	*2.49*	*1.61*	*12*	*.001*	*1.86*	*1.55*	*11*	*.001*
	1		*3.55*	*1.01*			*3.00*	*1.36*		
TPS	*0*	*0 - 5*	*2.00*	*1.53*	*18*	*.000*	*1.42*	*1.48*	*22*	*.000*
	1		*3.39*	*1.28*			*3.08*	*1.53*		

Where *PB:* *Buyers' perceived relative power*
PS: *Sellers' perceived relative power*
OMB: *Buyers' organizational monitoring*
OMS: *Sellers' organizational monitoring*
TPB: *Buyers' perceived time pressure*
TPS: *Sellers' perceived time pressure*

Table 6

3SLS ESTIMATION RESULTS FOR EQUATIONS 16-1 AND 16-2

Dependent Variable: CB

Predictors	**B**	*SE* **B**	*T*	*Sig. T*
PB	*-26.807*	*14.194*	*-1.889*	*.064 +*
OMB	*-25.522*	*18.422*	*-1.385*	*.171*
TSIB	*-16.393*	*10.091*	*-1.624*	*.100 +*
TPB	*40.308*	*19.385*	*2.079*	*.041 **
RTPB	*-24.763*	*12.686*	*-1.952*	*.055 +*
DB	*-17.554*	*17.264*	*-1.017*	*.313*
(CONSTANT)	*302.199*	*67.073*	*4.506*	*.000 ***

Overall Regression Results:

*R Square: 0.243, F = 4.74, Sig. F = .0005 ***

Dependent Variable: CS

Predictors	**B**	*SE* **B**	*T*	*Sig. T*
PS	*-28.695*	*12.212*	*-2.407*	*.019 **
OMS	*-12.976*	*15.009*	*-0.858*	*.394*
TSIS	*- 5.414*	*10.873*	*-0.498*	*.620*
TPS	*29.103*	*12.016*	*1.817*	*.074 +*
RTPS	*11.150*	*9.101*	*1.225*	*.225*
DS	*5.992*	*11.103*	*0.540*	*.591*
(CONSTANT)	*127.459*	*60.689*	*2.100*	*.039 **

Overall Regression Results:

R Square: 0.207, F = 2.74, Sig. F = .0197

*+: $\alpha < 0.1$; *: $\alpha < 0.05$; **: $\alpha < 0.01$*

Table 7

OLS REGRESSION RESULTS FOR EQUATION 15-1 AND 15-2

Dependent Variable: DB

Predictors	**B**	*SE* **B**	*Beta*	*T*	*Sig. T*
TPB	*-0.311*	*0.123*	*-0.289*	*-2.525*	*.014 **
RTPB	*-0.014*	*0.089*	*-0.018*	*-0.157*	*.876*
(CONSTANT)	*0.843*	*0.364*		*2.318*	*.023 **

Overall Regression Results:

R Square : *0.084*
F Value : *3.19*
Sig. F : *0.047*

Dependent Variable: DS

Predictors	**B**	*SE* **B**	*Beta*	*T*	*Sig. T*
TPS	*0.061*	*0.286*	*0.027*	*0.214*	*.831*
RTPS	*-0.129*	*0.179*	*-0.089*	*-0.723*	*.472*
(CONSTANT)	*1.717*	*0.683*		*2.514*	*.014 **

Overall Regression Results:

R Square : *0.008*
F value : *0.271*
Sig. F : *0.764*

**: $\alpha < 0.05$; **: $\alpha < 0.01$*

Hypothesis 5 was partially supported by the data since only the coefficient of risk-taking propensity in the buyers' group was statistically significant at α level of 0.05 while that in the sellers' group was not significant. The negative coefficient in the buyers' group coincides with the hypothesized direction and can be interpreted as suggesting that a buyer with a higher risk-taking propensity would have a lower concession rate relative to a more risk-averse buyer in the bargaining.

Hypothesis 6 was not supported by the data. Although the coefficient of time pressure on the discount rate in the buyers' group was statistically significant at α level of 0.05, the coefficient sign (negative) was opposite to the hypothesized direction. Moreover, the coefficient in the sellers' group was not significant although in predicted direction. Those results suggest that, in this study, buyers under higher time pressure possessed lower discount rates while sellers' discount rates were not influenced by the time pressure they were facing.

Hypothesis 7 was not supported by the data since the coefficient of risk-taking propensity on the discount rate was not significant in either the buyers' or the sellers' group, although both were in the right direction. This result shows that, in this study, we could not detect an influence of bargainers' risk-taking propensity on their discount rates.

Hypothesis 8 was not supported by the data. The coefficient of discount rate on concession rate was not significant in either the buyers' group or the sellers' group. This result implies that, in this study, we could not detect an influence of bargainers' discount rates on their concession rates.

Finally, **hypothesis 9**, the predictive power of the integrated model, was tested in two aspects: (1) its absolute predictive power, and (2) its relative predictive power compared to that of the Nash solution. Each of these is described as follows.

(1) To test the absolute predictive power of the integrated model, the predicted outcomes derived from equation 17 are presented in Table 8. The comparison of actual and predicted outcomes presented in Table 8 demonstrates that each pair of bargainers' actual outcomes was very close to its associated predicted outcomes. For the buyers' group, 84.3% of buyers' actual outcomes deviated less than 10% from associated predicted outcomes; for the sellers' group, 86% of actual outcomes deviated less than 10% from associated predicted outcomes.

Above results showing the closeness between actual and predicted outcomes were confirmed by the T-test comparison between actual and predicted outcomes presented in Table 9. The correlation coefficients between actual and predicted outcomes were very high (0.914 and 0.961 for buyers' and sellers' groups, respectively) and their mean differences were not significant (with 2-tail probability of 0.156 and 0.676 for buyers' and sellers' groups, respectively). Therefore, we conclude that actual and their associated predicted outcomes were statistically close to each other.

Then actual outcomes were regressed on predicted outcomes. Results presented in Table 10 and 11 show that both the constant term and the slope were significantly different from 0 at α level of 0.000. This result was true for both the buyers' and sellers' groups. Although the hypothesized slope, 1, did not lie within 95% confident intervals of the regressed slopes (0.785 to 0.981 and 0.789 to 0.917 for the buyers' and sellers' groups, respectively), the magnitudes of these two slopes (0.883 and 0.85) and their associated R-square values (0.83 and

Table 8

ACTUAL VERSUS PREDICTED OUTCOMES AND THE PERCENTAGE DEVIATION BASED ON THE INTEGRATED MODEL AND THE NASH SOLUTION

ID	*UBF*	*UBH1*	*IDEVB*	*NDEVB*	*USF*	*USH1*	*IDEVS*	*NDEVS*
103	*1200*	*1176.47*	*-.02*	*.04*	*1300*	*1323.53*	*.02*	*-.04*
104	*1300*	*1323.53*	*.02*	*-.04*	*1200*	*1176.47*	*-.02*	*.04*
107	*1300*	*1323.53*	*.02*	*-.04*	*1200*	*1176.47*	*-.02*	*.04*
108	*1200*	*1176.47*	*-.02*	*.04*	*1300*	*1323.53*	*.02*	*-.04*
109	*1100*	*1029.41*	*-.06*	*.14*	*1400*	*1470.59*	*.05*	*-.11*
110	*1100*	*1029.41*	*-.06*	*.14*	*1400*	*1470.59*	*.05*	*-.11*
203	*1200*	*1176.47*	*-.02*	*.04*	*1300*	*1323.53*	*.02*	*-.04*
204	*1200*	*1176.47*	*-.02*	*.04*	*1300*	*1323.53*	*.02*	*-.04*
206	*1200*	*1176.47*	*-.02*	*.04*	*1300*	*1323.53*	*.02*	*-.04*
207	*1300*	*1447.37*	*.11*	*-.04*	*1000*	*1052.63*	*.05*	*.25*
208	*1300*	*1323.53*	*.02*	*-.04*	*1200*	*1176.47*	*-.02*	*.04*
209	*1200*	*1176.47*	*-.02*	*.04*	*1300*	*1323.53*	*.02*	*-.04*
210	*1300*	*1323.53*	*.02*	*-.04*	*1200*	*1176.47*	*-.02*	*.04*
211	*1200*	*1176.47*	*-.02*	*.04*	*1300*	*1323.53*	*.02*	*-.04*
212	*1300*	*1323.53*	*.02*	*-.04*	*1200*	*1176.47*	*-.02*	*.04*
304	*1300*	*1323.53*	*.02*	*-.04*	*1200*	*1176.47*	*-.02*	*.04*
305	*1200*	*1176.47*	*-.02*	*.04*	*1300*	*1323.53*	*.02*	*-.04*
307	*1500*	*1617.65*	*.08*	*-.17*	*1000*	*882.35*	*-.12*	*.25*
309	*1300*	*1323.53*	*.02*	*-.04*	*1200*	*1176.47*	*-.02*	*.04*
310	*1500*	*1617.65*	*.08*	*-.17*	*1000*	*882.35*	*-.12*	*.25*
311	*1500*	*1617.65*	*.08*	*-.17*	*1000*	*882.35*	*-.12*	*.25*
403	*1300*	*1323.53*	*.02*	*-.04*	*1200*	*1176.47*	*-.02*	*.04*
404	*1700*	*1663.66*	*-.02*	*-.26*	*800*	*909.03*	*.14*	*.56*
405	*1300*	*1323.53*	*.02*	*-.04*	*1200*	*1176.47*	*-.02*	*.04*
406	*1300*	*1323.53*	*.02*	*-.04*	*1200*	*1176.47*	*-.02*	*.04*
407	*1300*	*1289.81*	*-.01*	*-.04*	*1200*	*1210.19*	*.01*	*.04*
408	*1500*	*1617.65*	*.08*	*-.17*	*1000*	*882.35*	*-.12*	*.25*
409	*1300*	*1323.53*	*.02*	*-.04*	*1200*	*1176.47*	*-.02*	*.04*
411	*1500*	*1617.65*	*.08*	*-.17*	*1000*	*882.35*	*-.12*	*.25*
504	*700*	*1133.81*	*.62*	*.79*	*1600*	*1588.73*	*-.01*	*-.22*
505	*800*	*830.86*	*.04*	*.56*	*1700*	*1689.71*	*-.01*	*-.26*
506	*1200*	*1176.47*	*-.02*	*.04*	*1300*	*1323.53*	*.02*	*-.04*
507	*1200*	*1176.47*	*-.02*	*.04*	*1300*	*1323.53*	*.02*	*-.04*
508	*1000*	*882.35*	*-.12*	*.25*	*1500*	*1617.65*	*.08*	*-.17*
509	*1100*	*1029.41*	*-.06*	*.14*	*1400*	*1470.59*	*.05*	*-.11*
510	*1100*	*1029.41*	*-.06*	*.14*	*1400*	*1470.59*	*.05*	*-.11*
511	*1200*	*1176.47*	*-.02*	*.04*	*1300*	*1323.53*	*.02*	*-.04*
512	*1000*	*882.35*	*-.12*	*.25*	*1500*	*1617.65*	*.08*	*-.17*

(Table 8 Continued)

ACTUAL VERSUS PREDICTED OUTCOMES AND THE PERCENTAGE DEVIATION BASED ON THE INTEGRATED MODEL AND THE NASH SOLUTION

ID	*UBF*	*UBH1*	*IDEVB*	*NDEVB*	*USF*	*USH1*	*IDEVS*	*NDEVS*
603	*1100*	*1029.41*	*-.06*	*.14*	*1400*	*1470.59*	*.05*	*-.11*
604	*1200*	*1176.47*	*-.02*	*.04*	*1300*	*1323.53*	*.02*	*-.04*
605	*1100*	*1029.41*	*-.06*	*.14*	*1400*	*1470.59*	*.05*	*-.11*
606	*1200*	*1176.47*	*-.02*	*.04*	*1300*	*1323.53*	*.02*	*-.04*
607	*1100*	*1029.41*	*-.06*	*.14*	*1400*	*1470.59*	*.05*	*-.11*
609	*1300*	*1323.53*	*.02*	*-.04*	*1200*	*1176.47*	*-.02*	*.04*
610	*1100*	*1166.67*	*.06*	*.14*	*1400*	*1333.33*	*-.05*	*-.11*
611	*1200*	*1176.47*	*-.02*	*.04*	*1300*	*1323.53*	*.02*	*-.04*
612	*1200*	*1176.47*	*-.02*	*.04*	*1300*	*1323.53*	*.02*	*-.04*
703	*1400*	*1219.51*	*-.13*	*-.11*	*1100*	*1280.49*	*.16*	*.14*
705	*1400*	*1578.95*	*.13*	*-.11*	*900*	*921.05*	*.02*	*.39*
706	*1500*	*1617.65*	*.08*	*-.17*	*1000*	*882.35*	*-.12*	*.25*
707	*1300*	*1323.53*	*.02*	*-.04*	*1200*	*1176.47*	*-.02*	*.04*
708	*1500*	*1617.65*	*.08*	*-.17*	*1000*	*882.35*	*-.12*	*.25*
711	*1200*	*1176.47*	*-.02*	*.04*	*1300*	*1323.53*	*.02*	*-.04*
712	*1400*	*1470.59*	*.05*	*-.11*	*1100*	*1029.41*	*-.06*	*.14*
803	*1100*	*1029.41*	*-.06*	*.14*	*1400*	*1470.59*	*.05*	*-.11*
804	*1200*	*1176.47*	*-.02*	*.04*	*1300*	*1323.53*	*.02*	*-.04*
805	*800*	*860.46*	*.08*	*.56*	*1700*	*1679.85*	*-.01*	*-.26*
806	*1100*	*1141.30*	*.04*	*.14*	*1400*	*1358.70*	*-.03*	*-.11*
807	*800*	*1003.43*	*.25*	*.56*	*1700*	*1632.19*	*-.04*	*-.26*
808	*1200*	*1176.47*	*-.02*	*.04*	*1300*	*1323.53*	*.02*	*-.04*
809	*500*	*654.67*	*.31*	*1.50*	*1800*	*1748.44*	*-.03*	*-.31*
810	*1200*	*1176.47*	*-.02*	*.04*	*1300*	*1323.53*	*.02*	*-.04*
811	*1000*	*882.35*	*-.12*	*.25*	*1500*	*1617.65*	*.08*	*-.17*
812	*500*	*654.67*	*.31*	*1.50*	*1800*	*1748.44*	*-.03*	*-.31*

Where: *ID:* *Bargaining pairs' identification number*

UBF: *Buyers' actual final outcomes*

UBH1: *Buyers' predicted outcomes based on the integrated model*

IDEVB: *Deviation of actual outcomes from the predicted outcomes based on the integrated model in buyers' group = (UBH1 - UBF)/UBF*

NDEVB: *Deviation of actual outcomes from the predicted outcomes based on the Nash solution in buyers' group = (UBN - UBF)/UBF*

USF, USH1, IDEVS, & NDEVS similar to the above except they are for the sellers' group

Table 9

T-TEST RESULTS FOR THE COMPARISON BETWEEN ACTUAL AND THE PREDICTED OUTCOMES BASED ON THE INTEGRATED MODEL

Variable	*Number of Cases*	*Mean*	*Std. Dev.*	*Difference of Means*	*t Value*	*2-tail Prob.*
UBF		*1200.00*	*221.11*			
	64			*-16.88*	*-1.43*	*.156*
		1216.88	*230.34*			
UBH1						
USF		*1284.38*	*204.10*			
	64			*- 3.40*	*-0.42*	*.676*
		1287.77	*228.58*			
USH1						

Where

UBF: Buyers' actual final outcomes
UBH1: Buyers' predicted final outcomes
USF: Sellers' actual final outcomes
USH1: Sellers' predicted final outcomes

Table 10

OLS REGRESSION RESULTS FOR ACTUAL OUTCOMES ON PREDICTED OUTCOMES IN BUYERS' GROUP

Dependent Variable: UBF (Buyers' actual final outcomes)

Independent Variable	**B**	*SE* **B**	*Beta*	*T*	*Sig. T*
UBH1(Predicted outcomes)	*0.88331*	*0.049692*	*0.914279*	*17.772*	*0.0000*
(Constant)	*126.1272*	*61.4711*		*2.052*	*0.0444*

Multiple R:	*0.91428*
R Square:	*0.83591*
Adjusted R Square:	*0.83326*
F:	*315.831*
Sig. F:	*0.0000*

Table 11

OLS REGRESSION RESULTS FOR ACTUAL OUTCOMES ON PREDICTED OUTCOMES IN SELLERS' GROUP

Dependent Variable: USF (Sellers' actual final outcomes)

Independent Variable	**B**	*SE* **B**	*Beta*	*T*	*Sig. T*
USH1(Predicted outcomes)	*0.85348*	*0.031826*	*0.95880*	*26.817*	*0.0000*
(Constant)	*186.2705*	*41.57346*		*4.481*	*0.0000*

Multiple R:	*0.95888*
R Square:	*0.91945*
Adjusted R Square:	*0.91817*
F:	*719.137*
Sig. F:	*0.0000*

0.92), along with the closeness results described in previous steps, indicate that the integrated model did demonstrate very good absolute predictive power in this study.

(2) To compare the relative predictive power between the integrated model and the Nash solution, the predicted outcomes based on the Nash solution must be derived first. It is straightforward to show that the predicted outcomes based on the Nash solution were $U_1 = 1250$ with $U_2 = 1250$ across all bargaining pairs in this study. The comparison of actual and predicted outcomes based on the Nash solution showed that only 53.1% and 51.6% of the buyers' and sellers' actual outcomes, respectively, deviated less than 10% from the Nash solution (This was drawn from the data presented in Table 8). The ranges of deviation were between -25% and 150% and between -31% and 56% in the buyers' and sellers' groups, respectively. To compare relative predictive power between the integrated model and the Nash solution, a pair-t-test was conducted between the deviation based on the integrated model (IDEV) and the deviation based on the Nash solution (NDEV). Because the deviations felt both in the positive and in the negative directions while a meaningful comparison should be based on the magnitude of the deviations. Therefore, the deviations were transformed to their absolute values (ABSIDEV and ABSNDEV), then a pair-t-test was conducted and the results are presented in Table 12. The results show that the mean values of the absolute deviation were 6.63% versus 16.73% and 4.23% versus 12.08% for integrated model compared to the Nash solution in the buyers' and sellers' groups, respectively. These results show that the deviations based on the integrated model were significantly lower than those based on the Nash solution. Based on above results, it is justifiable to conclude that the integrated model had a higher predictive power than that of the Nash solution in this study.

In sum, hypothesis 9 was supported by the data and the integrated model was proved to fit the data better than the Nash solution in this study.

So far the hypotheses were tested and results were described. Some further insights about these results are presented in the next section.

Table 12

T-TEST RESULTS FOR THE COMPARISON BETWEEN DEGREES OF DEVIATION BASED ON THE INTEGRATED MODEL AND ON THE NASH SOLUTION

Variable	*Number of Cases*	*Mean*	*Std. Dev.*	*Difference of Means*	*t Value*	*2-tail Prob.*
ABSIDEVB		*0.0653*	*0.094*			
	64			*-0.1020*	*-3.71*	*.000*
ABSNDEVB		*0.1673*	*0.282*			
ABSIDEVS		*0.0423*	*0.038*			
	64			*-0.0785*	*-6.77*	*.000*
ABSNDEVS		*0.1208*	*0.110*			

Where

ABSIDEVB: *Absolute value of the deviation between actual and predicted outcomes based on the integrated model in the buyers' group*

ABSNDEVB: *Absolute value of the deviation between actual and predicted outcomes based on the Nash solution in the buyers' group*

ABSIDEVS: *Absolute value of the deviation between actual and predicted outcomes based on the integrated model in the sellers' group*

ABSNDEVS: *Absolute value of the deviation between actual and predicted outcomes based on the Nash solution in the sellers' group*

DISCUSSION

The fact that hypotheses 1 and 4 were supported by the data in this study confirms the conclusions drawn from previous studies in social-psychological approach to bargaining that bargainers tend to concede more when they perceive that they are in a less powerful position relative to their opponents or when they are under time pressure. These findings also increase the generlizability of the theory since the theory was confirmed in an industrial marketing bargaining context in this study. Similarly, the partially supported hypothesis 5 confirms and enhances the generalizability of the theory that a bargainer (at least when the bargainer is a buyer) with a higher risk-taking propensity tends to concede less.

The supportive result of hypothesis 3 in buyers' group adds a new dimension to bargaining theory that a buyer who is with tougher self-image will behave more toughly; and hence tends to concede less. This result along with that of hypothesis 5 could bring useful implications to purchasing managers. For example, purchasing managers should consider such personality factors as tough self-image and risk-taking propensity when recruiting new buyers, or when assigning bargaining roles to their employees because the employees' future performance in negotiation will be influenced by such personal characteristics. [13]

The fact that while both tough self-image and risk-taking propensity influenced buyers' concession rate yet had no effect on sellers' concession rate, may lead to a conjecture that these two personality effects were surpressed by the role effect of sellers. Traditional salesmanship emphasizes that salesmen behave cautiously, pleasantly and not to be influenced by the salesmen's mood or undesirable personality when dealing with customers. Testing this conjecture can be an interesting future study.

The insignificant result related to hypothesis 2 led to further tests of the effect size and statistical power of the three manipulations and the research design in this study. Using Borenstein and Cohen's (1988) computer program, the effect sizes and statistical powers of perceived relative power, organizational monitoring, and time pressure were calculated and presented in Table 13. The results show that both perceived relative power and time pressure had medium to large effect sizes and reasonably high statistical power under the research design. Yet, the effect size of organizational monitoring was small and its statistical power was weak under the research design.

Therefore, it could be safer suggesting that the insignificant result of hypothesis 2 might be altered by increasing the sample size or improving its manipulation than concluding that bargainers' concession rates were not influenced by organizational monitoring at all. Another possible explanation is that the theory might have not been working in the context of this study. The simultaneous presence of these five social-psychological factors in the experiment might have suppressed the effect of organizational monitoring. For example, under high time pressure, bargainers might have perceived that the purpose of their vice president's presence was to push them to obtain agreement faster, hence suppressing the organizational monitoring effect. However, constrained by the data collected under the main-effect plan, we were unable to test such an interaction effect in this study. Yet, this can be a topic for a follow-up study.

A recent report by Bernstein in Business Week (April 29, 1991, P56) about effect of organizational monitoring on workers' motivation and productivity is worth mentioning. A survey of several major companies

in the service industries such as Federal Express, Bell Canada, USAA, and Northwest Airlines, showed that under supervisor's monitoring, workers were motivated to increase their speed, while quality deteriorated. Some experiments were conducted by relaxing the supervisor's monitoring and the results were encouraging. Quality improved while productivity (e.g., speed) stayed up. Hence, led to the following conclusion: "How to motivate workers: Don't watch them."

The insignificant results of hypotheses 6, 7, and 8 were all associated with discount rate. Although the measurement used for discount rate was directly derived from its economic definition and proved to be reliable by the data in this study as well as in Benzion et. al.,'s (1990) experimental economic study, a substantial portion of the subjects in this study expressed difficulty in answering the discount rate questions during the experiment. Hence, it is suspected that the insignificant results of hypotheses 6, 7, and 8 could have been due to the measurement problem of discount rate. Should this be the reason, a more appropriate instrument needs to be devised for a more conclusive testing result.

Finally, the supportive result of hypothesis 9 demonstrated that the explanatory power of the integrated model was good and proved to be better than that of the Nash solution in this study. However, 33 out of 64 pairs of outcomes were at (1300, 1200) or (1200, 1300). This result might be a manifestation of the 'fairness effect', which leads to the results that with complete information bargainers tend to reach outcomes with equal payoff (Siegel & Fouraker, 1960).

In sum, despite the poor results associated with discount rate, four out of the five crucial social-psychological factors did influence bargainers' concession rate in the way hypothesized in this study. Furthermore, the explanatory power of the integrated model was proved to be high and the integrated model predicted better than the Nash solution. Hence, we can conclude that the proposed model was generally supported by the data in this study.

Table 13

EFFECT SIZE AND STATISTICAL POWER CHECK FOR THE THREE MANIPULATED VARIABLES

Total N = 75 Number of Cells = 12 Mean N Per Cell = 6 ALPHA = 0.10

Dependent Variable = CB

Factor	*Number of Levels*	*N Per Level*	*Degrees of Freedom*	*Effect Size = f*	*Power*
A = PB	*3*	*25*	*2*	*0.294*	*0.675*
B = OMB	*2*	*37.5*	*1*	*0.155*	*0.360*
C = TPB	*2*	*37.5*	*1*	*0.450*	*0.976*
*A * B*					
*A * C*					
*B * C*					
*A * B * C*					

Dependent Variable = CS

Factor	*Number of Levels*	*N Per Level*	*Degrees of Freedom*	*Effect Size = f*	*Power*
A = PS	*3*	*25*	*2*	*0.210*	*0.436*
B = OMS	*2*	*37.5*	*1*	*0.056*	*0.136*
C = TPS	*2*	*37.5*	*1*	*0.510*	*0.993*
*A * B*					
*A * C*					
*B * C*					
*A * B * C*					

Computer Program Source:

Borenstein, Michael & Jacob Cohen (1988), Statistical Power Analysis: A Computer Program, Lawrence Erlbaum Associates, Inc., Hillsdale, NJ.

CONCLUSIONS

Based on the results of the hypotheses testing, the following conclusions were made. Four out of the five important social-psychological factors did influence bargainers' concession rate in the way hypothesized in this study. More specifically, bargainers tended to concede less when they perceive to be in a higher power position or under lower time pressure. Furthermore, bargainers representing buyers also tended to concede less when they were with tougher self-image, had higher risk-taking propensity. The insignificant results of organizational monitoring and discount rate might have been due to the possible confounding effect when those five social-psychological factors were presence simultaneously as in the context of this study, or due to measurement problems of these two variables. The integrated model proved to have high predictive power and to fit the data better than the Nash solution. Managers may use this integrated model to predict possible bargaining outcomes in their future bargaining task.

Several contributions were made by the present study. First, the proposed integrated model fills a critical gap in bargaining theory. Second, unlike previous studies in which only one or two factors were tested at a time, all five social-psychological factors were tested in the present study. Therefore, the significant effects of four social-psychological factors on bargainers' concession behavior are especially encouraging. Third, the empirical testing of the integrated model not only provides an example of testing the Cross model and proving the feasibility of integrating bargaining theory based on economic and social-psychological approaches, but also provides several managerial implications as follows: (1) The model can better predict future bargaining outcomes between a pair of bargainers. Hence, managers can use this integrated model to estimate possible future bargaining outcomes, and set up more efficient targets for their organizations when implementing the "Management by Objectives" project. (2) The empirical testing results are particularly useful. Marketing and purchasing managers can draw fruitful managerial implications from the findings about the influences of each of the five social-psychological factors. Through the control of these variables, the managers will be able to increase the company's profits or to achieve other relevant objectives. For example, since it is the perception that matters, marketing and purchasing managers should implement effective communication strategies to influence their bargaining counterpart to perceive a lower power position or higher time pressure and their own bargainers to perceive a higher power position and lower time pressure, so that the bargaining outcomes will be more favorable toward their own organizations. However, such a strategy may only be valid for a one-time negotiation, in a cooperative setting, and when both parties are not in a competitive situation. The identification of effective communication or influence strategies is an important and interesting research issue which warrants for further exploration. Since two personality factors were proved to influence bargaining behavior and outcomes as hypothesized, as another managerial application of the empirical findings, marketing and purchasing managers should use those personality factors as part of the selection criteria when recruiting new salesmen and purchasing agents or when assigning bargaining tasks to specific individuals, because the employees' future performance in negotiation will be influenced by such personality factors. (3) The proposed model will also be useful in predicting the outcomes of bargaining in an international marketing context because people from different countries or cultural backgrounds often use different rates of concession, hold divergent perceptions of the

power asymmetry and vary widely in their bargaining skills (Graham 1985; Graham, Kim, Lin, & Robinson 1988). Once the parameters are estimated, the outcomes predicted by the model could be a valuable reference for future bargaining between bargainers from the same pairs of countries (such as when the bargaining pairs consist of Japanese-American dyads).

There are several limitations to be aware of when applying this integrated model. First, like the Nash bargaining theory and the Cross bargaining model, the proposed integrated model is suitable for describing and predicting two-person, full information, cooperative bargaining problems only. The model concentrates on the question of division and accepts the assumption of full information that both parties' utility levels of all the possible outcomes are known to both parties. Although an assumption of full information doesn't sound descriptive of most real-world bargaining cases, it may result from information exchange between the two parties. Hence, what might have been extended to the integrated model is the information-exchange process prior to the bargaining to divide the surplus. Second, external validity of this study could be weak since the subjects were MBA students. Although Calder et. al., (1981, 1982, 1983) argued that using convenience samples, such as students, is sufficient for theory testing, Lynch (1982, 1983) argued that one should use a "selective approach" to extend the generlizability of the theory being tested. Before this model can be applied to an industry, we need to replicate the testing by collecting data from professional buyers and sales representatives from that industry. Such an applied extension would be appropriate as an immediate follow-up study. Third, like all the models with deterministic prediction, this integrated model also assumes that bargainers' utility functions will remain unchanged through the bargaining process. Such an assumption may be contradictory to Zartman's (1971, 1976) argument that a decision is made in bargaining by "changing the parties' evaluation of their values in such a way as to be able to combine their values into a single package, by persuasion, coercion or force" (Zartman, 1977: p70). Therefore, the proposed integrated model should be applied with care. For example, one should use a fixed utility score to predict the ultimate outcome. However, what described above actually is a strength in the perspective of methodology although a limitation in application. Fourth, the time pressure measure was manipulated by "trial constraints" and "cost of time". Although such a way of manipulation is widely used and proved to be effective in social-psychological literature, theoretically, it leads to the measure of time pressure only to the extent that the ratio of time/trial is constant.

This is only the first step in developing an integrated bargaining model in the marketing context. Further research effort can be directed to the following issues: (1) The model can be extended by identifying other relevant social-psychological factors and incorporating these factors into the model. (2) It is also important to step back to identify the determinants of those social-psychological factors and how they affect the relevant factors. Bargainers' reservation price and cross-cultural factors are two examples of the potential determinants. Bargainers' reservation price usually is an interesting and important factor in bargaining issues, while cross-cultural factors are especially crucial for bargaining in the international marketing context. (3) The potential interaction effects among these five social-psychological variables as well as between them and some potential moderating factors, such as trust and expectation for future cooperation, will also be important topics for future

research. Collecting more data by using a complete factorial design will enable the test of interaction effects among those factors proposed in the present study. (4) It would also be interesting to relax the assumption of full information. By providing bargainers incomplete information, we may expect to observe substantial inefficient agreements and to examine the possible impact of the social-psychological factors on the degree of inefficiency.

NOTES

1) A cooperative game is a game in which the players can make binding commitments, as opposed to a noncooperative game, in which they cannot (Rasmusen, 1989: p29).

2) Usually, M is a fixed quantity of some homogeneous good (e.g., a sum of money). For other cases in which the available amount of a good is variable, unknown, or perhaps not even defined, it is more appropriate to consider an ordering index P which ranges over the various outcome alternatives, taking, for example, large values for outcomes which are very favorable to bargainer 1 and small values for outcomes which are very favorable to bargainer 2. For detail refer to Cross (1969: p43-44, p84-85).

3) For detailed proof of the convergence property of the ratio of expectations, r_1/r_2, refer to Cross (1969: p52-55).

4) Cross (1977: p45) argues that "as the anticipated settlement dates approach, uncertainty will decline and payoff demands will become more reliable indicators of expectations."

5) Integrative bargaining refers to the processes by which high joint benefit is developed by bargainers and competitive bargaining refers to the processes by which bargainers seek to gain an advantage for the self at the other's expense (Walton & McKersie, 1965; Pruitt, 1981: p15 & 137).

6) Pruitt (1981: p11) indicates that the experiments in social-psychological studies of bargaining usually run five to fifteen pairs of subjects in each cell so that stable averages can be calculated on the measures taken.

7) A pilot study shows that most pairs reached agreement in about 10 rounds of offers under the full information condition; therefore, 10-round is chosen in the stimulus of high time pressure.

8) These three linear line segments were formed by connecting the eighteen efficient outcomes listed in Table 3. However, alternatives # 1, 2, 17, and 18 were deleted because they were inferior to the no-agreement outcome.

9) The questions not answered by the two subjects were not so important for the hypotheses testing because these questions were seven post-bargaining questions designed to measure the subject's satisfaction about the negotiation result.

EXHIBIT 1

OPINION QUESTIONNAIRE I

* PLEASE GIVE YOUR ANSWER DIRECTLY TO THE COMPUTER ANSWER SHEET.

For each of the following items, you are asked to evaluate your typical reactions. There is no right or wrong answer. In each case, think carefully about your past experience and choose the number which best describes you.

	1: Does not describe me at all						7:Describes me perfectly
1. I tend to hold on to my solution to a problem ----------	1	2	3	4	5	6	7
2. I generally try to satisfy the needs of other people ----------	1	2	3	4	5	6	7
3. I am willing to give in to the wishes of other people ----------	1	2	3	4	5	6	7
4. I argue my case with other people to keep my position ----------	1	2	3	4	5	6	7
5. I often go along with the suggestions of other people ----------	1	2	3	4	5	6	7
6. I don't like to concede to other people even under pressure ----------	1	2	3	4	5	6	7
7. I usually accommodate the expectations of other people ----------	1	2	3	4	5	6	7
8. I am generally firm in pursuing my side of the issue ----------	1	2	3	4	5	6	7
9. I dominate arguments until the other person agrees to my position --	1	2	3	4	5	6	7
10. I argue insistently for my stance ----------	1	2	3	4	5	6	7
11. I seldom assert my opinion forcefully ----------	1	2	3	4	5	6	7
12. I raise my voice to get another person to accept my position --------	1	2	3	4	5	6	7
13. I insist my position be accepted during a conflict ----------	1	2	3	4	5	6	7
14. I stand firm in my views during a conflict ----------	1	2	3	4	5	6	7
15. I stress my point by physically display (e.g., hitting my fist on the table) ----------	1	2	3	4	5	6	7
16. I am steadfast in my view, refusing to retreat ----------	1	2	3	4	5	6	7

EXHIBIT 2

OPINION QUESTIONNAIRE II

Instructions. On the following pages, you will find a series of situations that are likely to occur in everyday life. The central person in each situation is faced with a choice between two alternative courses of action, which we might call X and Y. Alternative X is more desirable and attractive than alternative Y, but the probability of attaining or achieving X is less than that of attaining or achieving Y.

For each situation on the following pages, you will be asked to indicate the minimum odds of success you would demand before recommending that the more attractive or desirable alternative, X, be chosen.

Read each situation carefully before giving your judgment. Try to place yourself in the position of the central person in each of the situations. There are six situations in all. Please do not omit any of them.

1. Mr. A, an electrical engineer, who is married and has one child, has been working for a large electronics corporation since graduating from college five years ago. He is assured of a lifetime job with a modest, through adequate, salary, and liberal pension benefits upon retirement. On the other hand, it is very unlikely that his salary will increase much before he retires. While attending a convention, Mr. A is offered a job with a small, newly founded company which has a highly uncertain future. The new job would pay more to start and would offer the possibility of a share in the ownership if the company survived the competition of the larger firms.

Imagine that you are advising Mr. A. Listed below are several probabilities or odds of the new company's proving financially sound.

Please check **the lowest probability** *that you would consider acceptable to make it worthwhile for Mr. A to take the new job.*

--------- The chances are 1 in 10 that the company will prove financially sound.
--------- The chances are 3 in 10 that the company will prove financially sound.
--------- The chances are 5 in 10 that the company will prove financially sound.
--------- The chances are 7 in 10 that the company will prove financially sound.
--------- The chances are 9 in 10 that the company will prove financially sound.
--------- Place a check here if you think Mr. A should *not* take new job no matter what the probabilities.

2. Mr. D is the captain of College X's football team. College X is playing its traditional rival, College Y, in the final game of the season. The game is in its final seconds, and Mr. D's team, College X, is behind in the score. College X has time to run one more play. Mr. D, the captain, must decide whether it would be best to settle for a tie score with a play which would be almost certain to work or, on the other hand, should be try a more complicated and risky play which

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